



TOOELE
ARMY
DEPOT

FINAL

**DECISION DOCUMENT
KNOWN RELEASES SWMUs 3, 11, 25, AND 30
TOOELE ARMY DEPOT
TOOELE, UTAH**

**Contract No. DACA31-94-D-0060
Delivery Order No. 1**

Prepared for:

TOOELE ARMY DEPOT
Tooele, Utah 84074

Prepared by:

URS
Dames & Moore

7101 Wisconsin Avenue, Suite 700
Bethesda, Maryland 20814

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DECEMBER 2001



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Tooele Army Depot

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Final Decision Document

for Known Releases Solid Waste Management Units 3, 11, 25 and 30

The Decision Document

After completion of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measure Study (CMS) for the Known Releases Solid Waste Management Units (SWMUs), the Tooele Army Depot (TEAD) has identified preferred corrective measures alternatives for soil and groundwater contamination at four of the SWMUs. The following corrective measures are put forth as initial recommendations only, not as final decisions, for public comment.

- X-Ray Lagoon (SWMU 3), monitor groundwater, abandon unnecessary wells, and apply land use restrictions to prevent residential use. [\$130,000]
- Laundry Effluent Pond and Waste Pile Areas (SWMU 11), excavate contaminated soil, dispose of soil off post, and apply land use restrictions. [\$410,000]
- Battery Shop (SWMU 25), excavate contaminated soil, dispose of soil off post, and apply land use restrictions. [\$190,000]
- Old Industrial Waste Lagoon (SWMU 30), no action. [\$0]

Figure 2, page 5, of this Decision Document shows the location of each Known Releases SWMU addressed herein.

These proposed corrective measures will significantly reduce risk to human health and the environment.

A public meeting to discuss the corrective measures proposed for the Solid Waste Management Units in this Decision Document will be announced to the public in the local newspaper. Anyone desiring personal notification of this or other environmental meetings should return the Mailing List form on page 39. If you should have any questions, or would like additional information, please feel free to contact Larry McFarland of the Tooele Army Depot Environmental Office at (435) 833-3504.

The Community's Role in the Selection Process

How to Submit a Formal Comment

The Army solicits input from the community on the actions proposed in this Decision Document. A comment period from January 1 to 31, 2002, is established to encourage public participation in this process. At the public meeting, the Army will present the results of the RFI, the CMS, and the Decision Document; answer questions; and accept both oral and written comments. Representatives of the EPA and State of Utah will be present to answer questions.

During the public comment period, you may submit a formal comment in any of the following ways:

1. Mail written comments to:
Tooele Army Depot
Attn: SMATE-CS-EO/Larry McFarland
Environmental Management Division
Building T8
Tooele, UT 84074-5000
2. Fax written comments to (435) 833-2839
3. Offer verbal comments during the public hearing.

Please note that there is a distinction between formal comments received during the public comment period and informal comments received outside of the comment period. Although TEAD will respond to all comments regardless of when they are received, only the formal comments postmarked by January 31, 2002, and TEAD's responses to those comments will be addressed.

Formal comments become part of the official public record. TEAD will consider all formal comments received during the public comment period prior to making the final decision for each site.

All formal comments and TEAD's written responses will be addressed in writing and will accompany the Final Decision Document for the Known Releases

SWMUs. Copies of the responses will be mailed to anyone who submits a formal comment. In addition, TEAD will announce the decision through the local news media and the mailing list. (A form for requesting addition of your name to the mailing is on the page 39 of this document).

Upon timely request, the comment period may be extended for 30 days. Such a request should be submitted in writing to TEAD. The request must be received no later than January 21, 2002.

For More Information

The Decision Document for the Known Releases SWMUs highlights information that can be found in greater detail in the RFI Report, the CMS Report, and other available reports. These reports are contained in the TEAD Administrative Record.

The Decision Document will be added to the Administrative Record upon completion. The Army encourages the public to review and comment on these supporting documents, which are available at the following locations:

Tooele Army Depot
Public Affairs Office
T-1 Headquarters Building
Tooele Army Depot, UT 84074

Tooele Public Library
47 East Vine Street
Tooele, UT 84112

Marriott Library
University of Utah
372 S. Marriott
Salt Lake City, UT 84112

Grantsville Public Library
198 West Main Street
Grantsville, UT 84029

X-RAY LAGOON (SWMU 3)

The X-Ray Lagoon is a 75- by 35-foot by 6-foot deep lined lagoon. From 1974 through 1990 it received rinsewater from film washing and diluted spent developer and fixer solutions from the Film Processing Building (Building 1223).

Soil, sediment, and groundwater samples were collected to determine if contamination exists as a result of previous activities. No contaminants of concern were detected in these samples.

Based on the sampling conducted at SWMU 3, there are no elevated cancer risks or hazards for the military or construction worker at the site. However, elevated risks and hazards were identified for the hypothetical future onsite resident.

The sitewide ecological assessment determined that activities at SWMU 3 are not likely to have harmful effects on plants or animals.

The reasonably anticipated future land use of SWMU 3 is military. To protect against future residential use, an evaluation of management measures is required.

Comparative Analysis of Alternatives X-Ray Lagoon (SWMU 3)		
Evaluation Criterion (a)		Alt. 1: Land use restrictions, groundwater monitoring, well abandonment
Technical	Performance	High
	Reliability	High
	Implementability	High
	Safety	High
Human health assessment		High
Environmental assessment		High
Administrative feasibility		High
Cost		\$130,000
Relevant section in Corrective Measures Study		3.2

(a) Rankings indicate the effectiveness of each alternative in meeting the evaluation criteria, relative to other alternatives.

Recommended Corrective Measures Alternative for X-Ray Lagoon (SWMU 3)

Alternative 1:

Land use restrictions, groundwater monitoring, and well abandonment are the recommended corrective measures for the X-Ray Lagoon.

For more information about SWMU 3, see pages 17 to 19, and Table 1 on page 31, in this Decision Document.

LAUNDRY EFFLUENT POND AND WASTE PILE AREAS (SWMU 11)

SWMU 11 consists of the laundry effluent pond, sewage pond and pit, septic tank and leach field, and waste piles. Soil and sediment samples were collected to determine if contamination exists as a result of previous activities. Elevated levels of lead and arsenic were identified in the waste piles. Elevated levels of semivolatile organic compounds were identified in the laundry effluent and sewage ponds.

Based on the sampling conducted at SWMU 11, there are no elevated cancer risks or hazards for the military worker at the site. Blood lead levels modeled for a military worker are elevated. Elevated risks, hazards, and blood lead levels were identified for the hypothetical future onsite resident.

The sitewide ecological assessment determined that the elevated metals in soil at the waste pile area present an unacceptable ecological risk.

The reasonably anticipated future land use of SWMU 10 is military. The Waste Pile Area, laundry effluent pond, and sewage pond require corrective action. The estimated volume of contaminated soil is 600 cubic yards in the Waste Pile Area and 82 cubic yards in the two ponds.

Comparative Analysis of Alternatives Laundry Effluent Pond and Waste Pile Areas (SWMU 11)			
Evaluation Criterion (a)		Alt. 1: Land use restrictions	Alt. 2: Excavation, off- post treatment/ disposal, land use restrictions
Technical	Performance	Low	High
	Reliability	High	High
	Implementability	High	Moderate
	Safety	High	Moderate
Human health assessment		Low	High
Environmental assessment		Low	High
Administrative feasibility		Low	High
Cost		\$12,000	\$410,000
Relevant section in Corrective Measures Study		4.2.1	4.2.2

- (a) Rankings indicate the effectiveness of each alternative in meeting the evaluation criteria, relative to other alternatives.

Recommended Corrective Measures Alternative for Laundry Effluent Pond and Waste Pile Areas (SWMU 11)

Alternative 2:

Excavation of contaminated soil, off-post treatment/disposal, and land use restrictions are the recommended corrective measures for the Laundry Effluent Pond and Waste Pile Areas.

For more information about SWMU 11, see pages 20 to 23, and Table 1 on page 31, in this Decision Document.

BATTERY SHOP (SWMU 25)

The Battery Shop, located in Building 1252, was used for the maintenance and repair of vehicle and forklift batteries from 1980 to 1993. Spent battery acid and washdown water from the Battery Shop and two washdown pads were discharged to a drainage ditch during site operations. Soil samples were collected to determine if contamination exists due to the battery acid and washdown discharge. Elevated levels of arsenic and lead were identified in the near-surface soil in the drainage ditch.

Based on the sampling conducted at SWMU 25, there are no elevated cancer risks for the military worker at the site, but hazards are unacceptable. Elevated risks and hazards were identified for the hypothetical future onsite resident.

The sitewide ecological assessment determined that the site poses a low to moderate ecological risk.

The reasonably anticipated future land use of SWMU 25 is military. The drainage ditch requires corrective action. The estimated volume of contaminated soil is 300 cubic yards.

Comparative Analysis of Alternatives Battery Shop (SWMU 25)

Evaluation Criterion (a)		Alt. 1: Land use restrictions	Alt. 2: Soil cover, land use restrictions	Alt. 3: Excavation, off- post disposal, land use restrictions	Alt. 4: Excavation, solidification, land use restrictions	Alt. 5: Excavation, soil washing, land use restrictions
Technical	Performance	Low	Moderate	High	Moderate	Moderate
	Reliability	Moderate	Moderate	High	Moderate	Moderate
	Implementability	High	High	High	Moderate	Moderate
	Safety	High	High	Moderate	Moderate	Moderate
Human health assessment		Low	Moderate	High	High	High
Environmental assessment		Moderate	High	High	High	High
Administrative feasibility		Low	High	High	Low	Moderate
Cost		\$22,000	\$87,000	\$190,000	\$270,000	\$360,000
Relevant section in Corrective Measures Study		5.2.1	5.2.2	5.2.3	5.2.4	5.2.5

(a) Rankings indicate the effectiveness of each alternative in meeting the evaluation criteria, relative to other alternatives.

Recommended Corrective Measures Alternative for Battery Shop (SWMU 25)

Alternative 3:

Excavation of contaminated soil, off-post treatment or disposal, and land use restrictions are the recommended corrective measures for the Battery Shop.

For more information about SWMU 25, see pages 24 to 27, and Table 1 on page 31, in this Decision Document.

OLD INDUSTRIAL WASTE LAGOON (SWMU 30)

SWMU 30 consist of former ditches and lagoons which are located within both BRAC and non-BRAC areas. From approximately 1945 to 1965, an estimated 125,000 gallons per day of wastewater containing solvents and heavy metals was discharged into the ditches and lagoons. Soil samples were collected to determine if contamination exists as a result of the wastewater discharges. No contaminants of concern were detected in these soil samples.

Based on the sampling conducted at SWMU 30, there are no elevated cancer risks or hazards for the industrial worker at the site. However, elevated risks were identified for the hypothetical future onsite resident requiring the evaluation of management measures.

The sitewide ecological assessment determined that SWMU 30 is not likely to have harmful effects on plants or animals.

Comparative Analysis of Alternatives Old Industrial Waste Lagoon (SWMU 30)			
Evaluation Criterion (a)		Alt. 1: No further action	Alt. 2: Land use restrictions
Technical	Performance	High	High
	Reliability	High	High
	Implementability	High	High
	Safety	High	High
Human health assessment		High	High
Environmental assessment		Moderate	Moderate
Administrative feasibility		High	High
Cost		\$0	\$24,000
Relevant section in Corrective Measures Study		6.2.1	6.2.2

- (a) Rankings indicate the effectiveness of each alternative in meeting the evaluation criteria, relative to other alternatives.

Recommended Corrective Measures Alternative for the Old Industrial Waste Lagoon (SWMU 30)

Alternative 1:

No further action is the recommended corrective measure for the Old Industrial Waste Lagoon.

For more information about SWMU 30, see pages 28 to 29, and Table 1 on page 31, in this Decision Document.

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INTRODUCTION*

This ***Decision Document*** briefly discusses the preferred ***corrective measures*** alternatives and supporting analyses for four ***solid waste management units (SWMUs)*** at Tooele Army Depot (TEAD), Tooele, Utah. The four SWMUs are listed below:

- SWMU 3 (X-Ray Lagoon)
- SWMU 11 (Laundry Effluent Pond and Waste Pile Areas)
- SWMU 25 (Battery Shop)
- SWMU 30 (Old Industrial Waste Lagoon (OIWL))

The Trinitrotoluene (TNT) Washout Facility (SWMU 10) and the Sanitary Landfill/Pesticide Disposal Area (SWMU 12/15) are also Known Releases SWMUs. However, based on discussions between TEAD, the Army, UDEQ, and USEPA, separate DD Reports will be issued for SWMUs 10 and 12/15.

This document is issued by the U.S. Army (the owner of TEAD), the U.S. Environmental Protection Agency (EPA), and the Utah Department of Environmental Quality (UDEQ; the regulatory support agency for TEAD) as part of their public participation responsibilities under the ***Resource Conservation and Recovery Act (RCRA)***.

Following the review of information received during the public comment period, the Army

and UDEQ will select a final corrective measures alternative for each of the SWMUs addressed herein. The Response to Comments and Final Decision Document and the ***RCRA Part B permit*** modification will present the selected corrective measures.

The Decision Document highlights information that can be found in greater detail in the Phase I ***RCRA Facility Investigation (RFI)*** Report, the Phase II RFI, the ***Corrective Measures Study (CMS)*** Work Plan, the CMS Report, and other available reports. The Army encourages the public to review and comment on these supporting documents, which are available at the following locations:

Tooele Army Depot
Public Affairs Office
T-1 Headquarters Building
Tooele Army Depot, UT 84074

Tooele Public Library
47 East Vine Street
Tooele, UT 84074

Marriott Library
University of Utah
372 S. Marriott
Salt Lake City, UT 84112

Grantsville Public Library
198 West Main Street
Grantsville, UT 84029

* Terms shown in bold italics are defined in the Word Notebook, pages 33 to 35.

PROGRAM SUMMARY

The program summary reviews historical information on TEAD and presents an overview of the RFI (including the human health *risk assessment (RA)* and the *ecological RA*) and the CMS.

FACILITY BACKGROUND

TEAD is located in Tooele Valley, Tooele County, Utah, immediately west of the City of Tooele (with a population of 13,887 (1990 census)) and approximately 35 miles southwest of Salt Lake City. The installation covers 23,473 acres; 1,700 acres (from an original 25,173) were transferred in December 1998 under the *Base Realignment and Closure (BRAC)* program. The surrounding area is largely undeveloped, with the exception of Tooele, Grantsville (population 4,500, north of TEAD), and Stockton (population 400, south of TEAD).

Land use surrounding the Depot includes pasture, cultivation, and rangeland grazing to the west and south. Figure 1 shows the location of TEAD.

TEAD was originally established as the Tooele Ordnance Depot in 1942. It was renamed the Tooele Army Depot - North Area (TEAD-N) in 1962 and given its present designation (TEAD) in June 1996. Since 1942, TEAD was used for the maintenance and repair of Army vehicles and equipment; the storage, maintenance, and disposal of munitions; and the support of other Army installations in the western United States.

The mission of maintaining and repairing vehicles and equipment was discontinued in 1995. The remaining two missions are expected to continue for the foreseeable future. A portion of TEAD, including the Administration Area and Maintenance Area, was transferred as part

of the BRAC program. These areas will be converted from military to industrial use. (The eastern portion of SWMU 30 is included in the BRAC parcel.)

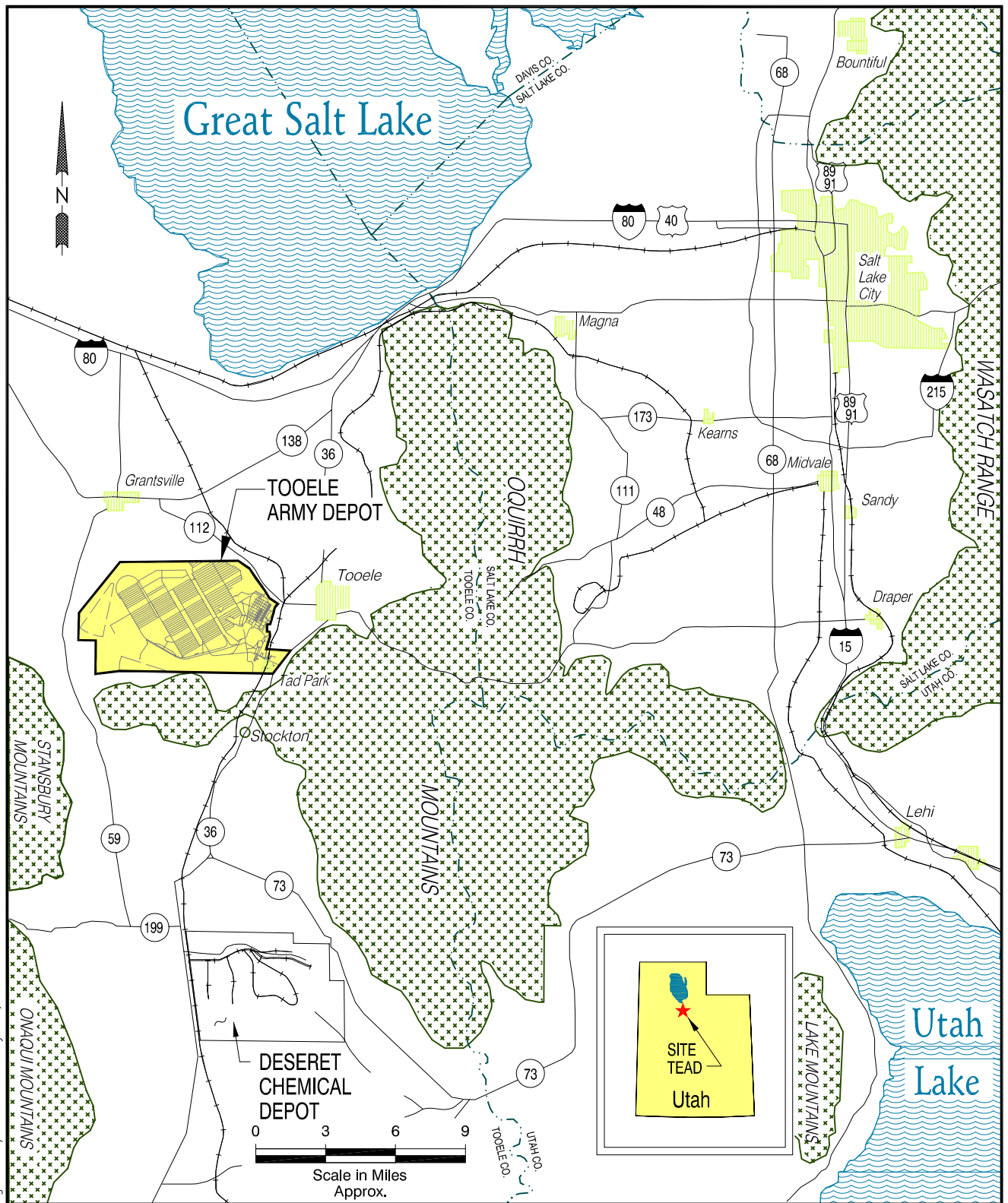
As a result of past operations at TEAD, a variety of known or suspected waste and spill sites have been identified. Environmental investigations from the late 1970s to the present have identified 57 locations referred to as SWMUs.

In October 1990, TEAD was placed on the *National Priority List (NPL)* under the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*. A *Federal Facility Agreement (FFA)* between the Army, EPA Region 8, and UDEQ designated 17 of the 57 SWMUs to be investigated under CERCLA.

In January 1991, TEAD was issued a *RCRA post-closure permit* for the Industrial Waste Lagoon (IWL), SWMU 2. The permit included a *Corrective Action Permit (CAP)* that required investigation and potential cleanup at 29 of the SWMUs. Currently, there are 40 SWMUs being addressed under the CAP. The Known Releases SWMUs discussed in this Decision Document are managed under the RCRA CAP program.

Figure 2 shows the locations of SWMUs 3, 11, 25, and 30 within TEAD. Descriptions of each SWMU are provided on pages 17 through 29.

The following sections present an overview of the RFI, including the baseline RA, the ecological RA, and the CMS.



SOURCE: RUST E&I, 1995

FIGURE 1
LOCATION MAP OF
TOOELE ARMY DEPOT
AND VICINITY

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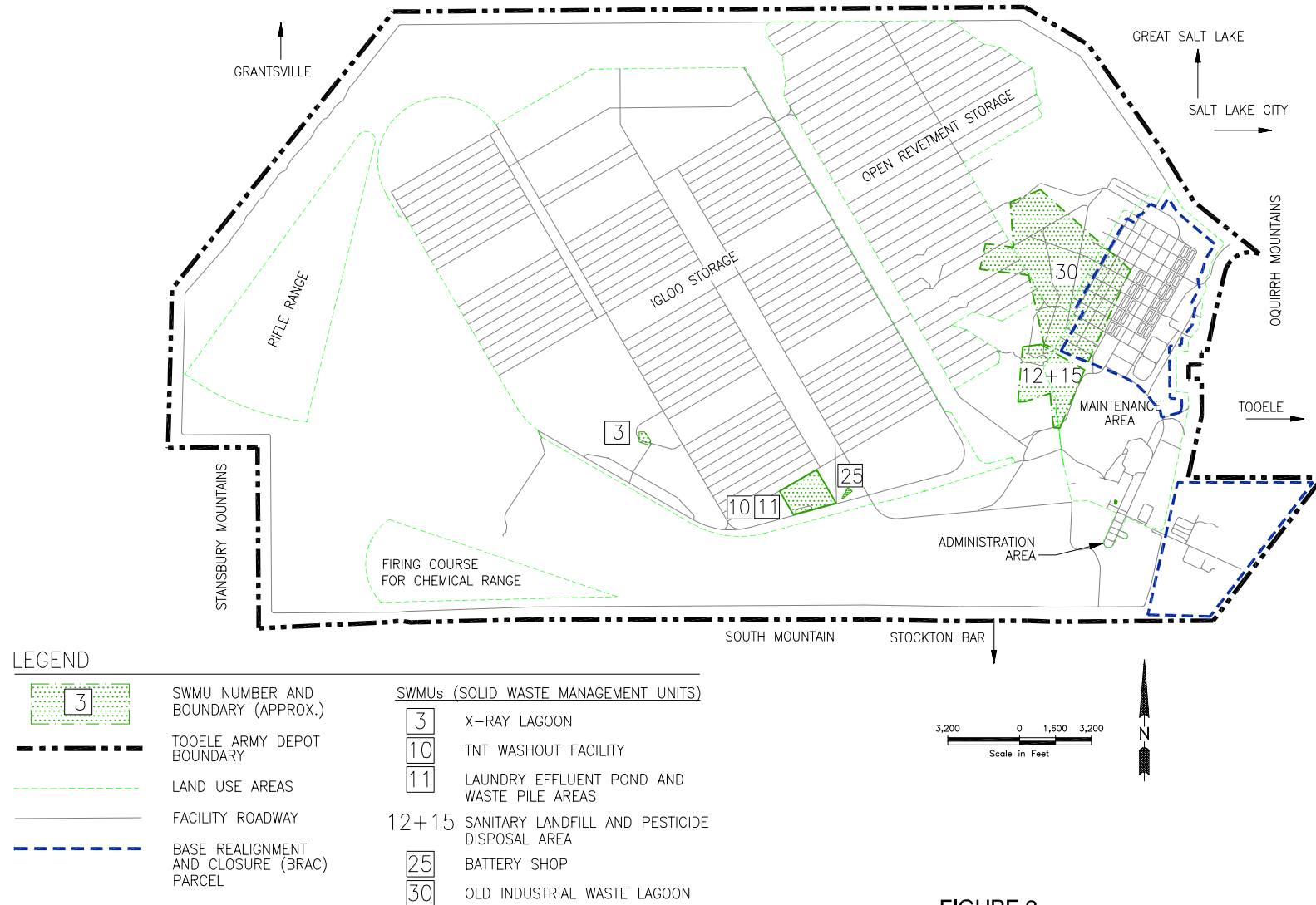


FIGURE 2
LOCATION OF KNOWN RELEASES SWMUs
IN THE CMS PROCESS
TOOELE ARMY DEPOT

RCRA FACILITY INVESTIGATION

Investigations were conducted at SWMUs 3, 11, 25, and 30 to evaluate the presence and extent of chemicals potentially released to the environment from past site activities. These investigations included the following:

- Collection and laboratory analysis of soil, sediment, surface water and groundwater samples to assess SWMU-related contaminant concentrations.
- Comparison of these concentrations to EPA guidelines to evaluate whether they are of potential concern to human health or the environment.
- Comparison of the metals concentrations detected in site samples to **background** metals concentrations. (Metals are naturally occurring in both soil and water.)

Chemicals that exceed EPA guidelines were identified **contaminants of potential concern (COPCs)**, which are those contaminants:

- Detected at levels above those found naturally in the environment.
- or –
- Detected at levels above EPA guidelines.

The human health RA evaluated potential human health effects due to each of the COPCs. The ecological RA evaluated potential effects of site contamination on plants and animals. The next two sections describe the RAs.

HUMAN HEALTH RISK ASSESSMENT

In accordance with EPA and State of Utah guidance, the human health RA evaluated potential *cancer risks* and *noncancer health effects* from exposure to the identified COPCs. Risks and effects are considered for the various *receptors* (current Depot worker, current industrial worker, future construction worker, current offsite resident, future adult resident, and future child resident) under different *exposure scenarios*.

Definition of Cancer Risks, Noncancer Health Effects, and Exposure Scenarios

The American Cancer Society has determined that the expected overall likelihood that an adult will develop cancer during a 70-year lifetime is one in three. The assessment of cancer risks for this program calculates the increased likelihood that an individual will develop cancer as a result of long-term site-related exposure to carcinogens over a 70-year lifetime.

According to EPA and UDEQ, a calculated cancer risk is unacceptable if the increased likelihood of getting cancer is greater than one in 10,000. Furthermore, a cancer risk of less than one in 1 million is considered to be acceptable and does not require remedial action. Sites with cancer risks between one in 10,000 and one in 1 million may require further consideration to determine whether *corrective action* is appropriate.

The assessment of noncancer health effects calculates the likelihood of risks other than cancer as a result of long-term exposure to contaminants. This is reported as a *hazard index* (HI). A calculated HI of less than 1.0 indicates that health effects expected from site-related contaminants are acceptable according to EPA and UDEQ standards.

Hazards may include individual weight gain or loss, organ weight changes, or changes in blood chemistry. They are usually determined based on data from animal laboratory studies or from human studies in the workplace. The term “hazards” is used to refer to noncancer health effects.

Blood lead levels are evaluated as a separate health effect and are treated the same as hazards. This evaluation uses an EPA model for lead uptake from the environment (including soil) into the human body. The U.S. Centers for Disease Control and Prevention (CDC) has established a target limit for lead concentration in children of 10 micrograms per deciliter (µg/dL) of blood in less than 5 percent of the model population. When extrapolated to adults, this limit is 11.1 µg/dL. EPA recommends that this model be used when lead levels in soil equal or exceed 400 micrograms per gram of soil (µg/g).

Potential cancer risks and noncancer hazards are calculated for the current Depot worker, current industrial worker, future construction worker, current offsite resident, future adult resident, and future child resident. These receptors may be exposed to COPCs by a variety of pathways or exposure scenarios. Exposure scenarios can be real or hypothetical, current or future.

The hypothetical residential exposure scenario must be evaluated for all sites. This scenario calculates the risks and hazards for an adult and a child living at the identified site full time. It is assumed that the residents are exposed to **surface soil** through several pathways, including:

- Getting dirt on the skin and absorbing contaminants into the body through the skin (dermal absorption).

- Eating soil directly (children) or inadvertently ingesting soil because hands are unclean (children or adults; ingestion).
- Breathing in dust (inhalation).
- Eating fruits or vegetables grown in contaminated soil (produce ingestion).
- Eating beef from cattle that have grazed on grasses growing in the contaminated soil (beef ingestion).

Using EPA exposure pathway guidelines and site-specific contaminant concentrations, it is possible to calculate the increased likelihood of developing cancer (from carcinogenic contaminants) or being exposed to hazards (from noncarcinogenic contaminants).

Risks and hazards are calculated for an onsite worker under the military land use exposure scenario. This calculation assumes that exposure may occur through ingestion, inhalation, or dermal absorption of surface soil during normal work hours. The worker is not assumed to eat food produced at the site. Also, for purposes of calculating risk, the worker is at the site fewer hours per day, fewer days per year, and fewer years than the resident. These assumptions are based on EPA guidelines and on reasonable information about TEAD workers.

If a SWMU is in the BRAC parcel, the future worker at the site is an industrial worker, not military. EPA provides guidelines for exposure to surface soil (e.g., a 5-day workweek) that differ somewhat from those for a Depot worker, who works 4 days a week. As before, exposure through ingestion, inhalation, and dermal absorption of surface soil are used in the calculation of industrial risks.

A construction worker at any SWMU may encounter subsurface contaminated soil during utility installation, utility maintenance, or construction. This worker may be exposed via ingestion, dermal absorption, or inhalation; however, he or she is not exposed to contaminants in food potentially produced at the site. The construction worker exposure is generally more intense (i.e., inhalation and ingestion rates of soil are higher than for the other exposure scenarios), but of a much shorter duration – which results in comparatively lower relative risks. EPA guidelines are used in calculating the associated cancer risks and hazards for the construction worker.

Regulatory Requirements

The RFI calculated cancer risks and hazards due to COPCs for the following exposure scenarios:

- Actual current and continued military.
- Future construction.
- Future industrial (BRAC portion of SWMU 30 only).
- Hypothetical future residential (adults and children).

The State of Utah Administrative Code (UAC) 315-101, “Cleanup Action and Risk-Based Closure Standards,” also referred to as the “**Risk Rule**,” is used to help determine what kind of corrective measures may be required.

The first part of the Risk Rule requires that the human health RA consider the residential exposure scenario for each SWMU. It also specifies the applicable exposure pathways for this scenario. Although residential use is hypothetical, it is evaluated as the scenario most protective of human health. The Risk Rule considers calculated risk for this scenario to be

unacceptable if the increased likelihood of getting cancer is greater than one in 1 million above the expected rate, if the HI is greater than 1.0, or if the modeled blood lead level is greater than the CDC limit of 10 µg/dL.

If there are no unacceptable risks or hazards under the residential scenario and all other applicable regulatory requirements are met, the site can be closed with no further action. However, corrective measures must be evaluated if the residential scenario presents unacceptable risks or hazards.

The extent of corrective measures required is then determined by considering the actual, **reasonably anticipated future land use** (i.e., industrial use for BRAC portion of SWMU 30, and continued military use at all other SWMUs). The Risk Rule considers calculated risk for reasonably anticipated future land use scenarios to be unacceptable if the increased likelihood of getting cancer is greater than one in 10,000 above the expected rate, if the HI is greater than 1.0, or if the estimated blood lead level is greater than the CDC limit of 10 µg/dL.

For those sites with unacceptable risks, hazards, or blood lead levels for the reasonably anticipated future land use scenario, corrective action (e.g., excavation or treatment) is evaluated. However, if the calculated risks or health effects are acceptable and all other regulatory requirements are met, only

management measures (e.g., land use or **deed restrictions**), are required. Potential impacts to groundwater are also considered. UAC R315-101-3, the “Principle of Non-Degradation,” states that a site with contamination must be monitored to ensure levels of contamination in groundwater, surface water, soils, and air do not increase beyond the existing levels of contamination. Immediate corrective action must occur to prevent further degradation of a medium if the level of contamination in that medium increases. The results of the ecological RA, potential impacts to groundwater, and the extent and concentrations of contaminants are also considered in selecting the most appropriate corrective measure.

A site that is determined to present an unacceptable risk or hazard for the reasonably anticipated future land use scenario is corrected to standards developed for that scenario. These standards are less stringent for military, industrial, or construction use than for residential use. Thus, in these three circumstances, contaminants may remain onsite at concentrations that, though lowered, may still present risks to the hypothetical future residential receptor. These **residual risks** are not addressed unless the land use changes (e.g., if one of the SWMUs slated for continuing military use is transferred under BRAC). If this occurs, the risks and corrective measures must be reevaluated.

Results

As discussed above, the human health RA considered the hypothetical residential exposure scenario for the Known Releases SWMUs 3, 11, 25, and 30 even though the Army plans to use its sites for continued military (non-BRAC parcel) purposes and the public plans to use its sites for industrial purposes (BRAC parcel). Under the Risk Rule, the RA identified potential unacceptable residential risks or hazards for the hypothetical future residential use scenario at all seven SWMUs. These potential unacceptable risks require the evaluation of corrective measures. (For SWMU 30, these risks/hazards derive from a naturally occurring metal, as is discussed later in this document)

At a minimum, management measures are required at all SWMUs except 30. However, additional factors – including regulatory requirements and future risks – may call for corrective measures beyond management only.

To determine the extent of corrective action alternatives required, the human health RA subsequently evaluated the reasonably anticipated future land use exposure scenarios, which are:

- Industrial for BRAC portion of SWMU 30.
- Military at SWMUs 3, 11, 25, and non-BRAC portion of 30.

Under the hypothetical future residential land use scenario, cancer risks greater than one in 1 million, an HI greater than 1.0, or blood levels above 10 µg/dL were identified at each SWMU. At SWMU 30, these arise from a naturally occurring metal below its background concentration.

Under the reasonably anticipated future land use scenarios, no excess cancer risks above one in 10,000 were identified at any of the SWMUs. However, an HI above 1.0 was identified at the Battery Shop (SWMU 25).

A blood lead level greater than 10 µg/dL was identified at the Laundry Effluent Pond and Waste Piles Area.

Because the RFI techniques for estimating blood lead levels have been replaced by improved lead models in adults, the CMS does not rely solely on the RFI results for identifying lead problems.

Therefore, based on these results from the human health RA, no corrective action is required at SWMUs 3 and 30. However, management measures – at a minimum – are required at SWMU 3. Active corrective measures are required at SWMUs 11 and 25.

ECOLOGICAL RISK ASSESSMENT

The ecological RA evaluated the potential effects of COPCs on plants and animals, with a focus on the areas and receptors most at risk. The following steps are included in the RA process:

- Site characterization – which includes surveying site soil, plant life, and animal life.
- Identification of ecological COPCs and their concentrations and toxicity.
- Selection of ecological receptors – the species of plants and animals observed or potentially present at the SWMUs.

- Calculation of ecological risk based on available habitat, COPCs, and ecological receptors.

Potentially significant adverse effects to ecological receptors were identified at:

- *Laundry Effluent Pond and Waste Pile Areas (SWMU 11).*

Based on these results, corrective measures are required to protect plants and animals at SWMU 11.

CORRECTIVE MEASURES STUDY

According to the Risk Rule, each of the Known Releases SWMUs presents unacceptable risks and hazards under the hypothetical future residential land use scenario. SWMU 25 presents unacceptable health effects for the reasonably anticipated future land use (i.e., military/industrial); SWMU 11 has unacceptable blood lead levels for military use.

The CMS evaluates corrective measures that are protective of both human health and the environment, and that comply with Federal, State, and local requirements. The CMS process includes:

- Development of *corrective action objectives* (CAOs), which are chemical-specific concentrations for each land use scenario.
- Comparison of the maximum concentrations of COPCs (i.e., chemicals detected at levels exceeding EPA guidelines, as identified in the RFI Report) to CAOs for the reasonably anticipated land use.
- Comparison of the *exposure point concentration* (EPC) for each COC to its CAO, as needed.
- Identification of potentially applicable corrective action alternatives.
- Evaluation and comparison of these alternatives.
- Recommendation of the most appropriate alternative for each SWMU.

Corrective Action Objectives

CAOs are used to focus the development of corrective action alternatives on technologies that are likely to achieve the desired target

levels. The primary qualitative CAO is to protect human health and the environment. The corrective measure must meet the intent of Federal, State, and local regulations – in this case, the State of Utah Risk Rule (UAC R315-101, including its “Principle of Non-Degradation”), Utah’s Solid Waste Facility Location Standards, Interim Status Requirements for Hazardous Waste Facilities (UAC R315-7), and TEAD’s Part B permit.

CAOs may also be quantitative – i.e., target cleanup concentrations for contaminants; they vary for each land use scenario because of the different receptors and exposure pathways.

Identification of Contaminants of Concern

COPCs that exceed CAOs are site-related chemicals that are determined to be responsible for elevated risks under the reasonably anticipated future land use scenario. They are referred to as *contaminants of concern* (COCs).

The CAO for chemicals that may cause cancer is the concentration of each compound that results in a potential calculated risk of one in 1 million – which, for industrial/military CAOs, is much stricter than the Risk Rule’s acceptable value of one in 10,000. Therefore, in some cases, industrial COCs were identified even though the calculated risk is less than one in 10,000. CAOs are consistent with EPA’s acceptable risk range as defined in the National Contingency Plan. The CAO for noncancer-causing chemicals is the concentration of each compound that results in an HI of 1.0. This is equivalent to the Risk Rule’s standard. A lead concentration of 1,800 µg/g is equivalent to a blood lead level of 10µg/dL.

The COCs are then evaluated in conjunction with results of the RA to determine what level of corrective actions must be evaluated. The EPC for each COC is compared to its CAO. If the EPC for a compound is less than its CAO,

the maximum concentration of that chemical does not pose a human health risk.

Under the reasonably anticipated future land use, no COCs were identified at SWMUs 3 and 30 (i.e., levels of contaminants onsite are below CAOs for that land use). However, COCs were identified in soil at the following SWMUs, as noted below:

- ***Semivolatile organic compounds (SVOCs)***, in surface soil and metals in surface and subsurface soil at the Laundry Effluent Pond and Waste Pile Areas (SWMU 11).
- Metals in surface soil at the Battery Shop (SWMU 25).

Following Utah and EPA guidance, these COCs were evaluated for distribution and concentration.

In accordance with the Risk Rule, the following sites require an evaluation of active corrective measures:

- *Laundry Effluent Pond and Waste Pile Areas (SWMU 11) – SVOCs, lead, and arsenic in soil.*
- *Battery Shop (SWMU 25) – lead and arsenic in soil.*

Management measures are evaluated for SWMUs 3 and 30.

Identification and Evaluation of Alternatives

The CMS identifies alternatives for each SWMU that meet the CAOs and are protective of human health and the environment. Each alternative consists of technologies or management measures that address the *media* of concern (e.g., groundwater, soil) and the COCs. More than one alternative may be identified for a particular area.

Alternatives are evaluated and compared for each SWMU to determine which alternative best meets the following criteria:

- **Technical criteria**

Performance – evaluates whether the corrective measures alternative can perform its intended function and meet the CAOs, including compliance with Federal, State, and local regulations. This criterion considers site and waste characteristics, and addresses the useful life of each alternative (i.e., the length of time the alternative maintains its intended level of effectiveness).

Reliability – describes the long-term effectiveness and permanence of each alternative. This criterion evaluates the adequacy of the corrective measures technology based on performance at similar sites, O&M requirements, long-term environmental monitoring needs, and residuals management measures.

Implementability – assesses the technical and institutional feasibility of executing a corrective measures alternative, including constructability, permit and legal/regulatory requirements, availability of materials, etc. This criterion also addresses the length of time from implementation of the

alternative until beneficial effects are realized.

Safety – considers the potential threats to workers, nearby communities, and the environment during implementation of the corrective measure.

- **Human health assessment** – evaluates the extent to which each alternative protects human health. This criterion considers the classes and concentrations of contaminants left onsite, potential exposure routes, and potentially affected populations. Residual contaminant concentrations are also compared to existing criteria, standards, or guidelines.
- **Environmental assessment** – evaluates short-and long-term effects of the corrective measure on the environment, including adverse impacts to environmentally sensitive areas.
- **Administrative feasibility** – considers compliance with applicable Federal, State, and local environmental and public health standards, requirements, criteria, or limitations.
- **Cost** – presents *capital* and annual *operation and maintenance (O&M)* costs for each corrective measures alternative. Capital costs include direct and indirect costs. Annual costs typically include labor, maintenance, energy, and sampling/analysis. For purposes of comparison, costs are presented in terms of *present worth*, which is the current value of a future expenditure. The cost estimates are based on conventional cost estimating guides, vendor information, and engineering judgment.

Recommended Alternatives

For each SWMU, the alternative that best protects human health and the environment, has proven reliable at other sites, and meets regulations is recommended to the public and UDEQ.

A detailed evaluation of alternatives is presented in the next section.

The recommended corrective measures alternatives for these Known Releases SWMUs are noted below:

- X-Ray Lagoon (SWMU 3)

Land use restrictions to prevent residential use of the site, groundwater monitoring, and eventual groundwater well abandonment.

- Laundry Effluent Pond and Waste Pile Areas (SWMU 11)

Excavation of contaminated soil, off-post treatment or disposal, and land use restrictions to prevent future residential use of the site.

- Battery Shop (SWMU 25)

Excavation of contaminated soil, off-post treatment or disposal, and land use restrictions to prevent future residential use of the site.

- Old Industrial Waste Lagoon (SWMU 30)

No further action.

SWMU SUMMARIES

The SWMU summaries present background information and results of the RFI, human health and ecological RAs, and CMS for the subject Known Releases SWMUs.

SWMU 3 (X-RAY LAGOON)

Site Background – SWMU 3 is slated to remain in use by the military. The X-Ray Lagoon is a 75- by 35-foot by 6-foot deep lined lagoon which from 1974 through 1990 received rinsewater from film washing and diluted spent developer and fixer solutions from the Film Processing Building (Building 1223). Little information is available concerning the history of operations prior to 1974, though Building 1223 was the site of the former North Area Redeye Missile Rebuild Facility.

Summary of RFI – Metals were detected in lagoon sediments, in soil from the standing liquid area, in sludge from the septic tank, and in various subsurface soil samples at levels exceeding background concentrations and were identified as COPCs.

The groundwater concentrations of metals detected in stainless steel monitoring wells were elevated compared to metals concentrations in polyvinyl chloride (PVC) wells. It is believed that corrosion of the steel wells caused the elevated levels of metals in those wells.

Summary of RAs – The human health RA identified cancer risks greater than the target value of 1×10^{-6} for the hypothetical future onsite residential child and adult receptors, and an elevated HI (i.e., greater than 1.0) for adult and child receptors. No elevated cancer risks or HIs were identified for actual current and likely future Depot personnel. Risks and HIs are from

soil/sediment exposure. No groundwater exposure occurs.

The site-wide ecological RA concluded that the COPCs detected in soil at SWMU 3 present a low ecological risk.

Regulatory Requirements – Because adverse health effects were identified for the hypothetical future onsite adult and child residents, the Risk Rule requires that corrective measures be evaluated for SWMU 3. However, the identified risks and hazards to actual current and likely future Depot personnel are below 1×10^{-4} and 1.0, respectively, which are the levels specified in the Risk Rule as requiring active remediation. Therefore, only management measures must be considered.

Identification of Corrective Measures

Alternative – No COCs were identified in soil samples at SWMU 3. Elevated levels of metals in groundwater are believed to be due to corrosion of stainless steel well materials, not to site-related activities. Therefore, no COCs are identified in groundwater, and no treatment technologies are considered for groundwater. The Risk Rule states that management measures must be evaluated for sites that exceed the thresholds of 1×10^{-6} risk or 1.0 HI for the hypothetical future residential land use scenario. Therefore, the only alternative considered for SWMU 3 is land use restrictions, groundwater monitoring, and well abandonment.

Alternative 1 – Land use restrictions, groundwater monitoring, and well abandonment

Land use restrictions prohibiting future residential use will be incorporated into the installation *master land use plan*.
Environmental protection (site management)

plans are developed to identify land use restrictions, as well as the maintenance and monitoring requirements for other institutional controls that may be implemented. These plans include legal descriptions and maps.

A monitoring program will continue to document the concentrations of metals in groundwater. Because the stainless steel wells may not yield samples representative of groundwater quality in the area, it is recommended that they be abandoned once it is verified that the elevated levels of metals in groundwater are from well corrosion. Groundwater monitoring will cease at this point.

Evaluation of alternative – a single alternative is evaluated at SWMU 3.

Land Use Restrictions and Well Abandonment – The application of land use restrictions and well abandonment at SWMU 3 meets the evaluation criteria, as detailed below:

- Technical criteria

- Performance – This alternative is rated high for performance because land use restrictions limit future exposure by restricting residential development of the X-Ray Lagoon and also meet the qualitative and quantitative CAOs. This alternative meets the identified goals for SWMU 3 with no decrease in effectiveness over time. Well abandonment of the stainless steel wells ensures that the corroded stainless steel wells no longer affect groundwater quality in the area.
- Reliability – This alternative is rated high for reliability because land use restrictions are effective over the long term and have been implemented at many sites with positive results. No

O&M, management of waste materials, or long-term environmental monitoring is required.

- Implementability – This alternative is rated high for implementability because SWMU 3 is currently under military use and incorporating restrictions into TEAD's master land use plan should not be difficult. This alternative is technically and administratively feasible, and meets the CAOs.
- Safety – This alternative poses minimal short-term risks to onsite workers who carry out the groundwater sampling and well abandonment procedures and is rated high for safety. Alternative 1 includes appropriate precautionary measures, such as the use of personal protective equipment.
- Human health assessment – This alternative is rated high for human health because restricting future residential development of the site protects human health by preventing residential exposure to the previously identified contaminants in soil at SWMU 3.
- Environmental assessment – This alternative is rated high because it has no effects on the current ecological environment surrounding the X-Ray Lagoon which is identified as low.
- Administrative feasibility – The implementation of land use restrictions meets the specified requirements of UAC R315-101 by preventing future residential development at this site. Because SWMU 3 is to remain under U.S. Army control, land use restrictions will be administered through the installation's Real Property Planning Board. Groundwater sampling presents no administrative difficulties. Therefore, this

alternative is considered to be administratively feasible and is rated high.

- Cost – The estimated present worth cost of implementing this corrective measures alternative is \$130,000.

Recommended Alternative – The application of land use restrictions, groundwater monitoring, and well abandonment is the recommended alternative for SWMU 3.

Land use restrictions are to be incorporated into TEAD's master land use plan. U.S. Army regulations direct that all revisions to the plan be evaluated with regard to potential effects on human health and the environment.

Unauthorized future use (i.e., residential) of the X-Ray Lagoon or transfer of ownership requires the resolution of conflicts between identified risks and proposed changes to land use.

Periodic inspections will ensure restrictions are being observed. Groundwater monitoring will continue until it is shown that conditions are acceptable. At this point, the steel wells will be abandoned.

SWMU 11 (LAUNDRY EFFLUENT POND AND WASTE PILE AREAS)

Site Background – SWMU 11 is slated to remain in use by the military. The laundry effluent pond was constructed in 1947 for the collection of laundry and shower water from Building 1267, and boiler water from Building 1237. SWMU 11 consists of the laundry effluent pond, sewage pond, sand pit, septic tank and leach field, and the Waste Pile Area located to the east. Discharge to the laundry effluent pond was discontinued in 1990; however, it continued to receive boiler water during the winter months until 1995. The bermed, unlined pond is approximately 16 feet deep, 80 feet wide, and 100 feet long.

The sewage pond, constructed between 1978 and 1990 for the collection of water from Building 1267, is bermed, unlined, and is 8 feet deep, 120 feet wide, and 134 feet long. However, it was never used, and any water observed in the pond may be the result of rain, snow melt, or infiltration from the adjacent septic system.

A shallow sand pit, located next to the new TNT washout pond, was reportedly excavated to provide cover material for the old TNT washout ponds.

The septic tank is located south of the sewage pond; the leach field is reportedly located beneath the pond. From 1948 through 1990, the septic tank and leach field reportedly received waste from the bomb reconditioning building (Building 1245, SWMU 10), Building 1267, and a building southwest of the site (Building 1254).

Waste piles identified in fall of 1992 were reported to contain wood fragments, metal banding, electrical wiring, metal shavings, and old (circa 1948) automobile parts. Some of this waste was removed during the RFI.

Summary of RFI – Elevated metals and SVOCs were detected in laundry effluent pond and sewage pond sediment and in surface soil, while septic tank sludge and subsurface soil contained elevated levels of metals, SVOCs, and *volatile organic compounds (VOCs)*. These contaminants were identified as COPCs. *Total petroleum hydrocarbons (TPHC)* and elevated metals were detected in soil near the waste piles and were identified as COPCs.

Elevated levels of metals and TPHC were detected in the Waste Pile Area and identified as COPCs.

Elevated metals and SVOCs were detected in laundry effluent pond surface water, while the sewage pond water contained VOCs, SVOCs, an explosive, and metals at concentrations exceeding backgrounds. These contaminants were identified as COPCs.

Summary of RAs – The human health RA identified cancer risks greater than the target value of 1×10^{-6} for the hypothetical future onsite residential child and adult receptors, and elevated HIs (i.e., greater than 1.0) for both receptors. No elevated cancer risks or HIs were identified for actual current and likely future Depot personnel. However, blood lead levels for resident and depot personnel exceeded the CDC target of 10 $\mu\text{g/dL}$.

The site-wide ecological RA concluded that the metals detected in soil at SWMU 11 present a ecological risk.

Regulatory Requirements – Because adverse health effects were identified for the hypothetical future onsite adult and child residents, the Risk Rule requires that corrective measures be evaluated for this SWMU. The identified risks and hazards to actual current and likely future Depot personnel are below 1×10^{-4} and 1.0, but blood levels are unacceptable.

Therefore, as specified in the Risk Rule, the SWMU requires an evaluation of active corrective measures.

Identification of Corrective Measures

Alternatives – Within the ponds, no COCs were identified for surface water. Antimony was detected near the sewage pond (9 feet below surface) at a concentration above its CAO; however, because no one is expected to contact material this deep during construction activities and the EPC is well below its CAO, antimony is not identified as a COC.

Bis(2-ethyhexyl)phthalate was identified in surface soil samples at the laundry effluent pond, but at a concentration only slightly above its CAO and in one isolated sample. Concentrations of the two SVOCs – benzo(b)fluoranthene and benzo(a)anthracene – which were detected in sediment samples collected from a small area within the sewage pond – exceeded their CAOs.

Elevated lead and arsenic detected in the Waste Pile Area are identified as soil COCs.

Corrective action technologies as well as management measures are required to address the Waste Pile Area soil and laundry effluent pond and sewage pond sediment at this SWMU. The Risk Rule states that active corrective measures must be evaluated for sites that exceed the thresholds of risk, HI or blood lead for the current and future land use scenario. Thus, the following corrective measures alternatives were considered for SWMU 11.

Alternative 1 – Land use restrictions

Application of land use restrictions to prevent future residential use.

Land use restrictions are to be incorporated into the installation master land use plan.
Environmental protection (site management)

plans are developed to identify land use restrictions, as well as the maintenance and monitoring requirements that may be implemented. These plans include legal descriptions and maps.

Alternative 2 – Excavation, off-post treatment/disposal, and land use restrictions

Excavation and off-post treatment/disposal of contaminated soil at an appropriate **treatment, storage, and disposal facility (TSDF)** or landfill. Soil is excavated to meet military use CAOs.

Land use restrictions are included to prevent future residential use as described for Alternative 1.

Evaluation of alternatives – The proposed corrective measures alternatives for SWMU 11 are evaluated and compared below.

- Technical criteria
 - Performance – Alternative 1 (land use restrictions) is rated low for performance because it does not meet the CAOs. Alternative 2 (excavation, off-post treatment/disposal of contaminated soil, and land use restrictions) is rated high because it meets both the quantitative and qualitative CAOs. Therefore, Alternative 2 best addresses the performance criterion.
 - Reliability – Both alternatives are rated high for reliability because they have been proven effective at other sites.
 - Implementability – Each alternative is easy to implement; however, Alternative 2 is rated moderate because it requires the use of more equipment, materials,

and contractors than Alternative 1. Based on this evaluation, Alternative 1 is the most easily implemented.

- Safety – Alternative 2 is rated moderate for safety because it requires the excavation and handling of soil with buried debris and contamination, and thus poses a short-term risk to remediation workers. In addition, transport to the TSDF may pose risks to off-post residential communities, though this is not expected. Safety issues are not applicable under Alternative 1 because it involves no intrusive activities.
- Human health assessment – Alternative 1 is rated low for human health because it does not meet the quantitative CAOs for current and future Depot workers; however, it does prevent future residential exposure. Alternative 2 is rated high because it protects both Depot workers and residents.
- Environmental assessment – Alternative 1 is rated low because the metals causing ecological risks remain in soil. Alternative 2 is rated high because it permanently removes the contaminated soil and eliminates the potential exposure of ecological receptors to site-related contamination.
- Administrative feasibility – Alternative 1 is rated low for administrative feasibility because it does not meet the requirements of UAC R315-101 due to the exceedance of quantitative CAOs in soil. Alternative 2 is rated high because it complies with all applicable Federal and State regulations.
- Cost – The estimated present worth costs for Alternatives 1 and 2 are \$12,000 and \$410,000, respectively.

Recommended Alternative – Alternative 2 is the recommended alternative for SWMU 11. It includes excavation and off-post treatment/disposal of the soil that is contaminated with metals (Waste Pile Area) and SVOCs (laundry effluent pond and sewage pond) at levels above military use CAOs. In addition, land use restrictions are applied to prevent future residential use of the site.

Land use restrictions are to be incorporated into TEAD's master land use plan. Because U.S. Army regulations direct that all revisions to the plan be evaluated with regard to potential effects on human health and the environment, unauthorized future use (i.e., residential) of SWMU 11, or transfer under BRAC, requires the resolution of conflicts between identified risks and proposed changes in land use. Periodic inspections will ensure restrictions are being observed.

The contaminated soil is excavated using standard heavy excavation equipment and then undergoes sampling and analysis. If the soil is classified as hazardous based on the results of the analysis (including total waste and toxicity characteristic leaching procedure (TCLP) analysis), the excavated soil is transported to an off-post Subtitle C hazardous waste landfill for direct disposal or to TSDF for treatment prior to disposal. It is assumed that the contaminated soil is sent to a TSDF for pretreatment to comply with applicable RCRA land disposal restrictions (LDRs). However, if the soil results are acceptable, the soil may be sent to a Subtitle D landfill.

Confirmation samples are collected following excavation to verify that the soil contamination above CAOs has been removed. Clean soil from an on-post borrow area is backfilled into the excavated areas, which are graded and vegetated to natural conditions.

Some long-term liability is potentially associated with the disposal of contaminated soil at a landfill. The residual risk results from soil with contaminant concentrations at or below military use CAOs but above residential use CAOs.

SWMU 25 (BATTERY SHOP)

Site Background – SWMU 25 is slated to remain in use by the military. The Battery Shop, located in Building 1252, was used for the maintenance and repair of vehicle and forklift batteries from 1980 to 1993. Important site features include two washdown pads (wooden and metal) located northeast of Building 1252, a discharge pipe from the building, and a drainage ditch used to collect washdown water from the pads as well as discharge from the Battery Shop. Spent battery acid and washdown water were discharged to the ditch throughout site operations. Beginning in 1982, these liquids were neutralized with sodium bicarbonate or sodium hydroxide. The shop floor was washed down daily using sodium bicarbonate, which was discharged to the ditch until 1990, when the drain was sealed and the sump leading to the drain pipe was used to collect washdown wastes. Beginning in 1986, battery acid was contained for disposal.

Summary of RFI – Metals were detected in near-surface soil in the drainage ditch area at levels exceeding background concentrations and were identified as COPCs.

Summary of RAs – The human health RA identified cancer risks greater than the target value of 1×10^{-6} for the hypothetical future onsite residential child and adult receptors, and elevated HIs for both receptors. Elevated HIs were identified for the actual current and likely future depot personnel.

The site-wide ecological RA concluded that the COPCs detected in soil at this SWMU do not present unacceptable ecological risks.

Regulatory Requirements – Because adverse health effects were identified for the hypothetical future onsite adult and child residents, the Risk Rule requires that, at a

minimum, management measures be evaluated for SWMU 25. The identified hazards to actual current and likely future Depot personnel are above 1.0, therefore, as specified in the Risk Rule the active corrective measures must be evaluated.

Identification of Corrective Measures

Alternatives – Unacceptable risks and hazards were identified for hypothetical future onsite residents; therefore, appropriate management measures must be implemented at this SWMU. In addition, lead, arsenic, and thallium were present at maximum concentrations above their respective CAOs in surface soil. However, arsenic has an EPC below its CAO and is likely due to a background soil variation, not to site-related contamination. Therefore, the following alternatives are considered for SWMU 25:

Alternative 1 – Land use restrictions

Application of land use restrictions to prevent future residential use, and maintenance of an existing fence around the perimeter of the contaminated area to prevent future residential use and intrusive soil activities (e.g., excavation without proper protection against dust inhalation).

Land use restrictions are to be incorporated into TEAD's master land use plan. Environmental protection (site management) plans are developed to identify land use restrictions, as well as the maintenance and monitoring requirements for other institutional controls (e.g., fencing) that may be implemented. These plans include legal descriptions and maps. The fencing will be inspected annually.

Alternative 2 – Soil cover and land use restrictions

Installation of a soil cover over areas of metals contamination to prevent human exposure and

contaminant migration via erosion, maintenance of an existing fence around the perimeter of the contaminated area to protect the cover and prevent future residential use and intrusive soil activities (e.g., excavation without proper protection against dust inhalation), and annual inspections to maintain the cover and to repair the fence, if necessary.

The covered areas are graded and vegetated to minimize erosion, and warning signs are erected. Land use restrictions are to be incorporated into TEAD's master land use plan, as described in Alternative 1.

Alternative 3 – Excavation, off-post treatment/disposal, and land use restrictions

Excavation and off-post treatment/disposal of metals contaminated soil at an appropriate TSDF or landfill. Soil will be excavated until military use CAOs are achieved.

Land use restrictions are to be incorporated into TEAD's master land use plan as described in Alternative 1.

Alternative 4 – Excavation, solidification/stabilization, and land use restrictions

Excavation of contaminated soil at levels above military use CAOs, and treatment of the contaminated soil onsite through **solidification/stabilization**. Solidification/stabilization binds the soil with a material such as cement to reduce the mobility of the metals.

Land use restrictions are to be incorporated into TEAD's master land use plan. These institutional controls are applied to prevent future residential use of the site.

Alternative 5 – Excavation, soil washing, and land use restrictions

Excavation of contaminated soil at levels above military use CAOs, treatment of the contaminated soil onsite through **soil washing**, and off-post treatment/disposal of the soil washing residuals waste stream at an appropriate TSDF or landfill.

Land use restrictions are to be incorporated into TEAD's master land use plan. These institutional controls are applied to prevent future residential use of the site.

Evaluation of Alternatives – The proposed corrective measures alternatives for SWMU 25 are evaluated and compared below.

- Technical criteria
 - Performance – Alternative 3 (excavation, off-post treatment/disposal, and land use restrictions) meets both the qualitative and quantitative CAOs and is rated high with respect to performance. Alternative 4 (excavation, solidification/stabilization, and land use restrictions), and Alternative 5 (excavation, soil washing, and land use restrictions) meet both the qualitative and quantitative CAOs but require a treatability study and are rated moderate with respect to performance. Alternative 2 (soil cover and land use restrictions) is moderate for performance because it meets the CAOs only if the cover is properly maintained. Alternative 1 (land use restrictions) is rated low because it does not meet CAOs.
 - Reliability – Alternative 3 is rated high for reliability because the technologies have been proven effective at other sites, and no O&M activities or long-

term monitoring are required. Alternatives 1 and 2 are rated moderate because they do not permanently remove site contamination and require annual inspection and maintenance of the fence and/or soil cover. Alternatives 4 and 5 are rated moderate because a treatability study is required to further evaluate their effectiveness and permanence, and 5-year site inspections are recommended to ensure the long-term effectiveness of the solidification/stabilization process.

- Implementability – Because Alternative 1 requires no equipment, materials, or contractors, it is easy to implement and is rated high. Alternatives 2 and 3 are also rated high because equipment, materials, and contractors are readily available locally. It is estimated that Alternatives 1, 2, and 3 could be implemented within 1 month. Alternatives 4 and 5 are rated moderate because there are fewer contractors experienced in performing these treatment processes. It is estimated that Alternatives 4 and 5 would require 2 months for implementation. Subsurface utilities would only pose a problem for Alternatives 2, 3, 4, and 5 if utilities occur in the top few feet of soil.
- Safety – Alternative 1 is rated high for safety because no intrusive activities are required for implementation. Alternative 2 is rated high for safety because it does not require the excavation and handling of contaminated soil and presents no significant short-term risk to off-post residential communities or on-post workers. Alternative 4 is rated moderate because it involves the excavation and treatment of contaminated soil. Because

Alternatives 3 and 5 involve the excavation and handling of contaminated soil and the off-post shipment of either the soil or the soil-washing treatment residuals to a Subtitle C landfill or TSDF, they are rated moderate for safety.

- Human health assessment – Alternatives 3, 4, and 5 are rated high in terms of human health protection. Alternative 3 removes the contaminated soil from SWMU 25. Alternatives 4 and 5 use on-site treatment to reduce COC concentrations in the affected soil. Alternative 2 is rated moderate because inspection and maintenance of the soil cover and fence is required to prevent exposure. Alternative 1 is rated low because it does not meet quantitative CAOs for current and future Depot workers.
- Environmental assessment – Alternative 2 is rated high for environmental protection because the soil cover minimizes the exposure of ecological receptors to contaminants at the site. Alternatives 3, 4, and 5 are also rated high for environmental protection because excavation and removal/treatment of the contaminated soil are also estimated to reduce the risks to ecological receptors at SWMU 25 to a low level. Alternative 1 is rated moderate because low to moderate (but not unacceptable) ecological risks remain at the site.
- Administrative feasibility – Alternatives 2 and 3 are rated high for administrative feasibility because they meet the requirements of UAC R315-101. Although Alternatives 4 and 5 are also expected to meet these requirements, they may require a RCRA treatment permit. Alternative 4 is rated moderate. Alternative 5 is rated low because placing stabilized soil at the site

presents administrative difficulties.

Alternative 1 is rated low. It does not meet the requirements of UAC R315-101 because of exceedance of the quantitative CAOs for lead and thallium in surface soil.

- **Cost** – Of the five corrective measures alternatives, Alternative 1 has the lowest cost, estimated to be \$22,000. The estimated present worth costs of Alternatives 2, 3, 4, and 5 are \$87,000, \$190,000, \$270,000, and \$360,000, respectively.

Recommended Alternative – Alternative 3 is the recommended alternative at SWMU 25. It includes excavation and off-post treatment/disposal of the soil that is contaminated with metals at levels above military use CAOs. In addition, land use restrictions are applied to prevent future residential use of the site.

Land use restrictions are to be incorporated into TEAD's master land use plan. Because U.S. Army regulations direct that all revisions to the plan be evaluated with regard to potential effects on human health and the environment, unauthorized future use (i.e., residential) of SWMU 25, or transfer under BRAC, requires the resolution of conflicts between identified

risks and proposed changes in land use.

Periodic inspections will ensure restrictions are being observed.

The contaminated soil is excavated using standard heavy excavation equipment and then undergoes sampling and analysis. If the soil is classified as hazardous based on the results of the analysis (including total waste and TCLP), the excavated soil is transported to an off-post Subtitle C hazardous waste landfill for direct disposal or to TSDF for treatment prior to disposal. It is assumed that the contaminated soil is sent to a TSDF for pretreatment to comply with applicable RCRA LDRs.

However, if the soil results are acceptable, the soil may be sent to a Subtitle D landfill.

Confirmation samples are collected following excavation to verify that the soil contaminated with lead concentrations above CAOs has been removed. Clean soil from an on-post borrow area is backfilled into the excavated areas, which are graded and vegetated to natural conditions.

Some long-term liability is associated with the disposal of contaminated soil at a landfill. The residual risk results from soil with contaminant concentrations at or below military use CAOs but above residential use CAOs.

SWMU 30 (OLD INDUSTRIAL WASTE LAGOON)

Site Background – Although most of the OIWL will continue to be controlled by the Army, part of the area is included in the BRAC parcel and is designated for industrial use. The OIWL consists of seven former standing liquid areas (called lagoons), and nine ditches. This SWMU was operated from approximately 1945 to 1965, discharging an estimated 125,000 gallons per day. The wastewater contained solvents and heavy metals from degreasing, metal cleaning, stripping, painting, and other maintenance operations.

Summary of RFI – Metals were detected in surface soil at levels exceeding background concentrations and were identified as COPCs. One VOC (toluene) and SVOCs were also detected in surface soil and were identified as COPCs.

Summary of RAs – The human health RA identified cancer risks greater than 1×10^{-6} and an elevated HI for the hypothetical future onsite residential child and adult receptors. No elevated cancer risks or HIs were identified for actual current and likely future industrial workers. The risks and hazards to the residential receptors arise from one sample containing arsenic at 32.5 $\mu\text{g/g}$. Naturally occurring background levels of arsenic are 32 $\mu\text{g/g}$ at TEAD. Therefore, the risks and HI are not elevated relative to background and arsenic should not be considered a COPC.

The site-wide ecological RA concluded that SWMU 30 is unlikely to pose unacceptable ecological risks.

Regulatory Requirements – Because adverse health effects were identified for the hypothetical future onsite adult and child residents, the Risk Rule requires that corrective

measures be evaluated for SWMU 30. However, the identified risks and hazards to actual current and likely future industrial worker are below 1×10^{-4} and 1.0, respectively, which are the levels specified in the Risk Rule as requiring active remediation. Therefore, only management measures must be considered.

Identification of Corrective Measures

Alternatives – No COCs above background were identified for either surface or subsurface soil at SWMU 30. Because groundwater contamination at SWMU 30 is already being addressed through the clean-up actions at the Industrial Waste Lagoon (SWMU 2), no COCs were identified for groundwater. The Risk Rule states that management measures must be evaluated for sites that exceed the thresholds of 1×10^{-6} risk and 1.0 HI for the hypothetical future residential land use scenario. Therefore, land use/deed restrictions are considered for SWMU 30. In addition, no further action is considered because the risks and hazards derive from naturally occurring arsenic at SWMU 30.

Alternative 1 – No further action

Take no further action at this site.

Alternative 2 – Land use/deed restrictions

Application of land use restrictions to prevent future residential use for the portion of SWMU 30 remaining under continued U.S. Army use and application of deed restrictions to prevent future residential use of the BRAC portion of SWMU 30.

Land use restrictions are to be incorporated into the installation master land use plan. Environmental protection (site management) plans are developed to identify land use restrictions, as well as the maintenance and monitoring requirements for other institutional controls (e.g., fencing) that may be

implemented. These plans include legal descriptions and maps. Deed restrictions are legally binding and are incorporated into the permanent deed for transfer of the BRAC parcel from TEAD to the buyer. Deed restrictions on the BRAC property are governed by the ***Covenants, Conditions, and Restrictions*** (CCR). In addition to the existing CCRs, a site management plan will be delivered upon acceptance of the Decision Document. In this plan, the area subject to deed restrictions is surveyed and legally defined. This plan also describes the restrictions that apply to the SWMU and periodic inspections and monitoring to ensure the deed restrictions are being observed.

Evaluation of Alternatives – The proposed corrective measures alternatives for SWMU 30 are evaluated and compared below.

- Technical criteria
 - Performance – Both Alternative 1 (no further action) and Alternative 2 (land use/deed restrictions) are rated high because they meet both the quantitative and qualitative CAOs.
 - Reliability – Both alternatives are rated high for reliability because there are no unacceptable risks at this SWMU.

- Implementability – Each alternative is easy to implement and are rated high.
- Safety – Safety issues are not applicable under either alternative because they involve no intrusive activities.
- Human health assessment – Both alternatives are rated high because there are no unacceptable risks or hazards at the site.
- Environmental assessment – Both alternatives are rated moderate because neither has any effects on the moderate ecological risk.
- Administrative feasibility – Both alternatives are rated high because they comply with all applicable Federal and State regulations.
- Cost – The estimated present worth costs for Alternatives 1 and 2 are \$0 and \$24,000, respectively.

Recommended Alternative – **No further action** is the recommended alternative for SWMU 30. The site has no COPCs or COCs. The risks and hazard calculations in the RA included naturally-occurring concentrations of arsenic.

PROPOSED ALTERNATIVES

The recommended alternatives for Known Releases SWMUs 3, 11, 25, and 30 are listed below. Table 1 presents a comparative analysis of the alternatives.

- SWMU 3 (X-Ray Lagoon)
 - Land use restrictions, groundwater monitoring, and well abandonment
- SWMU 11 (Laundry Effluent Pond and Waste Pile Areas)
 - Excavation, off-post treatment/disposal, and land use restrictions
- SWMU 25 (Battery Shop)
 - Excavation, off-post treatment/disposal, and land use restrictions
- SWMU 30 (Old Industrial Waste Lagoon)
 - No further action

TABLE 1

Summary of Comparative Analysis of Corrective Measures Alternatives
Known Releases SWMUs 3, 11, 25, and 30
Tooele Army Depot

SWMU	Technical Evaluation							
Corrective Measures Alternative (a)	Performance	Reliability	Implementability	Safety	Human Health Assessment	Environmental Assessment	Administrative Feasibility	Cost (\$)
X-Ray Lagoon (SWMU 3)								
Alternative 1: Land use restrictions, groundwater monitoring, and well abandonment	Meets all identified CAOs	Proven effective at other sites	Easily implemented under current conditions	Minimal short-term risk to onsite workers	Protective of human health	No environmental impacts identified	Meets requirements of UAC R315-101	130,000
Laundry Effluent Pond and Waste Pile Areas (SWMU 11)								
Alternative 1: Land use restrictions	Does not meet quantitative CAOs for PAHs and metals	Proven effective at other sites; no long-term monitoring required	Easily implemented under current conditions	Not of concern	Quantitative CAOs for current and future Depot workers not met	Does not eliminate potentially unacceptable ecological exposure	Does not meet requirements of UAC R315-101	12,000
Alternative 2: Excavation, off-post treatment/disposal, and land use restrictions	Meets all identified CAOs	Proven effective at other sites; no long-term monitoring required	Easily implemented under current conditions	Short-term risk to off-post communities and onsite workers minimized by engineering and safety controls	Protective of human health	Prevents exposure of ecological receptors to contaminated soil	Meets requirements of UAC R315-101	410,000
Battery Shop (SWMU 25)								
Alternative 1: Land use restrictions	Does not meet quantitative CAOs for lead and thallium	Proven effective at other sites; maintenance and annual inspection of fence required	Easily implemented under current conditions	Not of concern	Quantitative CAOs for current and future Depot workers not met	No unacceptable environmental risks identified	Does not meet requirements of UAC R315-101	22,000
Alternative 2: Soil cover and land use restrictions	Meets all identified CAOs if soil cover is properly maintained	Proven effective at other sites; maintenance and annual inspection of soil cover required	Easily implemented under current conditions	Short-term risk to onsite workers minimized by engineering and safety controls	Protective of human health if soil cover is properly maintained	No unacceptable environmental risks identified	Meets requirements of UAC R315-101	87,000
Alternative 3: Excavation off-post treatment/disposal, and land use restrictions	Meets all identified CAOs	Proven effective at other sites; no long-term monitoring required	Easily implemented under current conditions	Moderate short term risk to off-post communities and onsite workers minimized by engineering and safety controls	Protective of human health	No unacceptable environmental risks identified	Meets requirements of UAC R315-101	190,000

TABLE 1 (cont'd)

SWMU	Technical Evaluation							
Corrective Measures Alternative (a)	Performance	Reliability	Implementability	Safety	Human Health Assessment	Environmental Assessment	Administrative Feasibility	Cost (\$)
Alternative 4: Excavation, solidification/stabilization, and land use restrictions	Meets identified CAOs; treatability study required	Treatability studies needed	Number of experienced vendors limited; 2 months implementation time estimated	Moderate short term risk to onsite workers minimized by engineering and safety controls	Protective of human health	No unacceptable environmental risks identified	Likely meets requirements of UAC R315-101, presents administrative difficulties	270,000
Alternative 5: Excavation, soil washing, and land use restrictions	Meets all identified CAOs; treatability study required	Proven effective at other sites, treatability study required; no long-term monitoring required	Number of experienced vendors limited; 2 months implementation time estimated	Moderate short term risk to off-post communities and onsite workers minimized by engineering and safety controls	Protective of human health	No unacceptable environmental risks identified	Meets requirements of UAC R315-101	360,000
Old Industrial Waste Lagoon (SWMU 30)								
Alternative 1: No further action	Meets all identified CAOs	No long-term monitoring required	Easily implemented under current conditions	Not of concern	Protective of human health	Unlikely to pose excessive or unacceptable risk to ecological receptors	Meets requirements of UAC R315-101	0
Alternative 2: Land use/deed restrictions	Meets all identified CAOs	Proven effective at other sites; no long-term monitoring required	Easily implemented under current conditions	Not of concern	Protective of human health	Unlikely to pose excessive or unacceptable risk to ecological receptors	Meets requirements of UAC R315-101	24,000

(a) The recommended corrective measures alternative is shown in bold type.

WORD NOTEBOOK

Background: Concentrations in environmental samples collected from surrounding areas not affected by site activities.

Base realignment and closure (BRAC): Program under which the U.S. Army facilitates and promotes conversion of excess Army facilities and property to private or public sector reuse.

Blood lead level The concentration of lead in a person's blood, usually measured in micrograms per deciliter.

Cancer risk: The increased likelihood that an individual will develop cancer as a result of site-related exposure over a 70-year lifetime.

Capital cost: Direct construction costs, such as labor and materials, plus indirect costs, such as engineering and permitting.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A program established to identify and clean up sites where hazardous substances have been or may have been released to the environment. This Act is commonly known as Superfund.

Contaminants of concern (COCs): Chemicals present at levels above quantitative CAOs.

Contaminants of potential concern (COPCs): Chemicals present at levels above background or EPA or State guidelines. Determined during the RFI phase of the RCRA process; all COPCs were included in the human health and ecological RAs.

Corrective action: An action that physically changes the site to meet corrective action objectives. See "management measure."

Corrective action objective (CAO): Goal for protecting human health and the environment. A quantitative CAO is the numerical goal for cleanup of media (e.g., soil, water).

Corrective action permit (CAP): Specifically for TEAD, a permit issued by the State in January 1991 to address the cleanup of contaminated groundwater; required the Army to investigate the possible contamination of 40 SWMUs at TEAD.

Corrective measure: Management control or technology to clean up or minimize the migration of contaminants or to reduce exposure to humans/wildlife.

Corrective measures study (CMS): Component of the RCRA process that identifies, screens, and compares corrective measures alternatives for site-specific contamination and risk.

Covenants, Conditions, and Restrictions (CCRs): Deed restrictions on BRAC property are governed by the Declaration of Covenants, Conditions, and Restrictions for Economic Development Conveyance, November 1998. The CCRs dictate that deed restrictions are enforceable by the U.S. Government, the Redevelopment Agency of Tooele City, and the transferee, or by other designated government agencies.

Decision Document: Presents the preferred corrective measures alternatives for selected sites; required as public participation responsibilities under RCRA.

Deed restriction: A legally binding notice in a real property deed that limits the actual use of an area; applicable to sites that are part of the BRAC program.

Ecological risk assessment (RA): Process to identify all components of the biological system at a defined site, to determine the potential effects of contaminants, and to identify possible remedies for potential problems.

Exposure point concentration (EPC): Statistically derived value representing the likely concentration that an individual will be exposed to if he or she is working/living in the area of the SWMU.

Exposure scenario: A combination of an exposure pathway (i.e., release point to receptor) and receptor-specific variables (intake, contact rate, body weight, and exposure frequency).

Federal facility agreement (FFA): Legal document that describes the rules and responsibilities of the Army, EPA, and State of Utah in determining risks and providing agreed-upon corrective action.

Hazard index (HI): Likelihood of adverse health effects from exposure to chemicals that do not cause cancer, HI values less than 1.0 indicate a low likelihood; greater than 1.0 a high likelihood.

Land use restriction: A restriction in land use that limits the actual use of an area; applicable to sites that are not part of the BRAC program. Restrictions are incorporated into the TEAD master land use plan.

Management measure: Control such as fencing, deed restrictions, or monitoring

that includes no physical removal or treatment of identified contaminants.

Media: Elements of the environment, such as soil, sediment, groundwater, surface water, and air.

Master land use plan: Plan maintained by each Federal facility that specifies land use. The overall purpose of the master plan is to describe and analyze existing facilities, conditions, and future requirements of the installation. The real property planning board has authority over land use at the base, and is responsible for developing, enforcing, and modifying the installations master land use plan. This document must be reviewed prior to obtaining the programming documents required for approval of new construction.

National Priority List (NPL): Established by EPA, a list that identifies sites eligible for remedial action under CERCLA. EPA has a structured program for evaluating sites and placing them on the NPL.

Noncancer health effects: Adverse health effects other than cancer, which may include weight loss or gain, organ changes, or blood chemistry changes.

Operation and maintenance (O&M) costs: Costs of annual operation and maintenance, including labor and materials.

Present worth: If invested at the start of a project, the amount of money that is sufficient to cover all costs (capital costs and annual O&M) over the planned life of the corrective measure.

RCRA facility investigation (RFI): Component of the RCRA process that

identifies the types, amounts, and locations of contaminants.

RCRA Part B permit: Permit issued by the State for operation of hazardous waste facilities; TEAD maintains a RCRA Part B permit for operation of the sewage lagoons and the open burn areas.

RCRA post-closure permit: Permit issued by the State that defines actions required at a closed RCRA site.

Reasonably anticipated future land use: A realistic assessment of land use from a consensus of community and local planning authorities, based on federal/state land use designation, comprehensive community master plans, and zoning laws or maps.

Receptor: A human, plant, or animal at the receiving end of an exposure pathway.

Residual risk: Risk from materials or chemical remaining onsite.

Resource Conservation and Recovery Act (RCRA): Provides a regulatory program for active sites to prevent mismanagement of hazardous solid waste.

Risk assessment (RA): Appraisal of the actual or potential effects of a hazardous waste SWMU on human health and the environment.

“Risk Rule”: State of Utah regulation, “Cleanup Action and Risk-Based Closure Standards” (UAC R315-101).

Semivolatile organic compounds (SVOCs): A class of organic compounds that is analyzed as a group and is comparatively heavier (i.e., less volatile) than VOCs.

Soil washing: An engineering technique for separating fine, contaminated soil from coarse, clean soil particles.

Solid waste management unit (SWMU): Area where hazardous substances, pollutants, and contaminants may have been disposed.

Solidification/stabilization: An engineering process that treats lead in soil to form stable lead phosphate minerals in a solid form.

Total petroleum hydrocarbons (TPHC): All hydrocarbon compounds that are of the type and weight to be associated with diesel fuel, oil, or gasoline.

Treatment, storage, and disposal facility (TSDF): Facility capable of treating, storing, or disposing of hazardous waste.

Volatile organic compound (VOC): A class of organic compounds that is analyzed as a group and is comparatively lighter (i.e., more volatile) than SVOCs.

ACRONYMS AND ABBREVIATIONS

BRAC	Base Realignment and Closure
CAO	Corrective action objective
CAP	Corrective Action Permit
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
COC	Contaminant of concern
COPC	Contaminant of potential concern
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
FFA	Federal Facility Agreement
HI	Hazard index
IWL	Industrial Waste Lagoon
LDR	Land disposal restriction
µg/dL	Microgram per deciliter
µg/g	Microgram per gram
NPL	National Priorities List
O&M	Operation and maintenance
OIWL	Old Industrial Waste Lagoon
PVC	Polyvinyl chloride
RA	Risk Assessment
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
TCLP	Toxicity characteristic leaching procedure
TEAD	Tooele Army Depot

ACRONYMS AND ABBREVIATIONS (cont'd)

TEAD-N	Tooele Army Depot - North Area
TPHC	Total petroleum hydrocarbons
TSDF	Treatment, storage, and disposal facility
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
VOC	Volatile organic compounds

GLOSSARY OF EVALUATION CRITERIA

Technical criteria

Performance – evaluates whether the corrective measures alternative can perform its intended function and meet the CAOs, including compliance with Federal, State, and local regulations. This criterion considers site and waste characteristics, and addresses the useful life of each alternative (i.e., the length of time the alternative maintains its intended level of effectiveness).

Reliability – describes the long-term effectiveness and permanence of each alternative. This criterion evaluates the adequacy of the corrective measures technology based on performance at similar sites, O&M requirements, long-term environmental monitoring needs, and residuals management measures.

Implementability – assesses the technical and institutional feasibility of executing a corrective measures alternative, including constructability, permit and legal/regulatory requirements, availability of materials, etc. This criterion also addresses the length of time from implementation of the alternative until beneficial effects are realized.

Safety – considers the potential threats to workers, nearby communities, and the environment during implementation of the corrective measure.

Human health assessment – evaluates the extent to which each alternative protects human health. This criterion considers the classes and concentrations of contaminants left onsite, potential exposure routes, and potentially affected populations. Residual contaminant concentrations are also compared to existing criteria, standards, or guidelines.

Environmental assessment – evaluates short- and long-term effects of the corrective measure on the environment, including adverse impacts to environmentally sensitive areas.

Administrative feasibility – considers compliance with applicable Federal, State, and local environmental and public health standards, requirements, criteria, or limitations.

Cost – presents capital and annual O&M costs for each corrective measures alternative. Capital costs include direct and indirect costs. Annual costs typically include labor, maintenance, energy, and sampling/analysis. For purposes of comparison, costs are presented in terms of *present worth*, which is the current value of a future expenditure. The cost estimates are based on conventional cost estimating guides, vendor information, and engineering judgment.

MAILING LIST

The TEAD Environmental Management Division maintains a mailing list of people interested in activities related to the Known Releases SWMUs. If you did not receive this Decision Document by mail and want your name added to the mailing list, or if you want your name deleted, please indicate below and mail the completed form to:

Larry McFarland/SMATE-CS-EO
Environmental Management Division
Tooele Army Depot, Building T8
Tooele, UT 84074-5000

Name: _____

Affiliation (if any): _____

Address: _____

City: _____ State: _____ Zip Code: _____

☐ Please add my name to the mailing list.

☐ Please delete my name from the mailing list.

**SIGNATURES AND SUPPORT AGENCY ACCEPTANCE
OF THE SELECTED ALTERNATIVE AT SWMU 3**

The selected alternative for the X-Ray Lagoon (SWMU 3) is land use restrictions, groundwater monitoring, and well abandonment. The total cost of this action is estimated at \$130,000. The appropriate approval authority for this action is the Tooele Army Depot Installation Commander.

Arnold P. Montgomery LTC, OD
Commanding
Tooele Army Depot

Date

DECLARATION STATEMENT FOR SWMU 3

Because this corrective measure will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, deed restrictions, groundwater monitoring, and well abandonment will ensure continued adequate protection of human health and the environment.

**SIGNATURES AND SUPPORT AGENCY ACCEPTANCE
OF THE SELECTED ALTERNATIVE AT SWMU 11**

The selected alternative for the Laundry Effluent Pond and Waste Pile Areas (SWMU 11) is excavation of contaminated soil, off-post treatment or disposal, and land use restrictions. The total cost is estimated at \$410,000. The appropriate approval authority for this action is the Tooele Army Depot Installation Commander.

Arnold P. Montgomery LTC, OD
Commanding
Tooele Army Depot

Date

DECLARATION STATEMENT FOR SWMU 11

The selected corrective measure for the Laundry Effluent Pond and Waste Pile Areas is protective of human health and the environment, attains Federal and State requirements, and is cost effective. This corrective measure satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

**SIGNATURES AND SUPPORT AGENCY ACCEPTANCE
OF THE SELECTED ALTERNATIVE AT SWMU 25**

The selected alternative for the Battery Shop (SWMU 25) is excavation of contaminated soil, off-post treatment or disposal, and land use restrictions. The total cost is estimated at \$190,000. The appropriate approval authority for this action is the Tooele Army Depot Installation Commander.

Arnold P. Montgomery LTC, OD
Commanding
Tooele Army Depot

Date

DECLARATION STATEMENT FOR SWMU 25

The selected corrective measure for the Battery Shop is protective of human health and the environment, attains Federal and State requirements, and is cost effective. This corrective measure satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

**SIGNATURES AND SUPPORT AGENCY ACCEPTANCE
OF THE SELECTED ALTERNATIVE AT SWMU 30**

The selected alternative for the Old Industrial Waste Lagoon (SWMU 30) is no further action. There is no cost associated with this action. The appropriate approval authority for this action is the Tooele Army Depot Installation Commander.

Arnold P. Montgomery LTC, OD
Commanding
Tooele Army Depot

Date

DECLARATION STATEMENT FOR SWMU 30

The selection of no action for the Industrial Waste Lagoon is protective of human health and the environment and attains Federal and State requirements because the unacceptable risks to future residents derive from arsenic detected at comprehensive basewide background levels.